



17323

21415

3 Hours/100 Marks

Seat No.

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- Instructions :** (1) **All** questions are **compulsory**.  
(2) Answer **each** next main Question on a **new** page.  
(3) Illustrate your answers with **neat** sketches **wherever** necessary.  
(4) Figures to the **right** indicate **full** marks.  
(5) **Assume** suitable data, if **necessary**.  
(6) **Use** of Non-programmable Electronic Pocket Calculator is **permissible**.  
(7) **Preferably**, write the answers in **sequential** order.
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**MARKS**

1. Attempt **any ten**.

**20**

- Define cycle and time period of an alternating quantity.
- Write down the units of R, L, C and G.
- Define impedance of A.C. circuit and state its unit.
- Define quality factor of series A.C. circuit.
- What is admittance of parallel A.C. circuit ? State its unit.
- Define conductance and susceptance in case of parallel circuit.

**P.T.O.**



- g) Define unbalanced three phase load.
- h) Write down relation between line and phase values of voltages and currents in 3 phase star connected system.
- i) How current source can be converted in to equivalent voltage source ?
- j) State Thevenin's theorem.
- k) Find  $Z_L$  to transfer maximum amount of power from source to load in Fig.A.

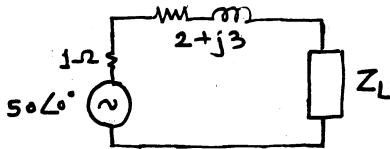


Fig. A

- l) State the behaviour of pure L at the time of switching.

2. Attempt **any four**.

16

- a) Explain the response of A.C. supply to pure inductance; draw wave diagram for the same.
- b) Write down different power's in A.C. circuits, also write their equation's and their units.
- c) Draw wave form and vector diagram to show following voltage and current.  
 $v = 100 \sin \omega t$   
 and  $i = 4 \sin (\omega t - 30^\circ)$
- d) Explain resonance in series A.C. circuit and also derive equation for resonant frequency for the same.
- e) Compare series and parallel circuits on any six points.
- f) State any four advantages of polyphase circuits over single phase circuits.

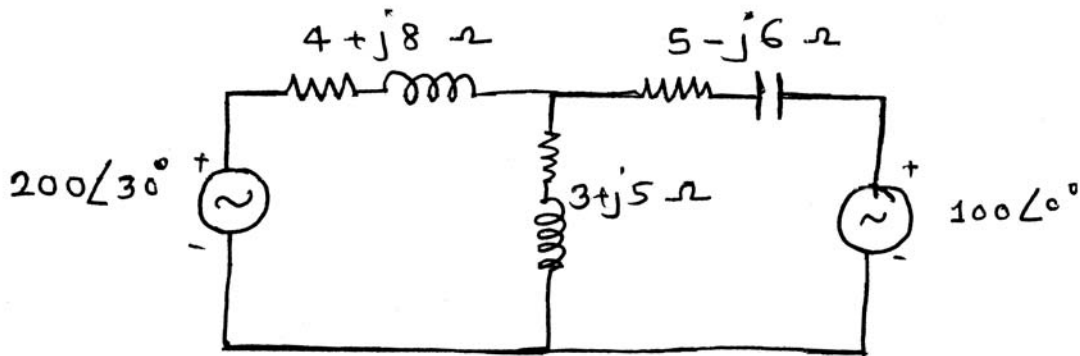


MARKS

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3. Attempt any two.

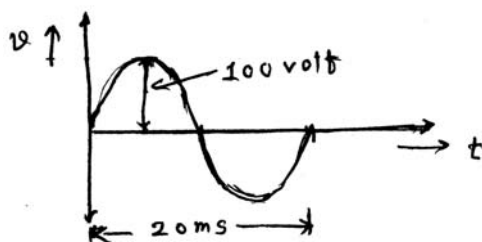
- 1) A coil of resistance 50 ohm and inductance of 0.1 H is connected in series with 100  $\mu$ F capacitor. The combination is supplied with 230 V 50 Hz A.C. supply. Calculate voltage across each, current through the circuit, power factor and draw complete vector diagram.
- 2) A balanced delta, consists of per phase impedance of  $5 + j7$  ohm. It is supplied with 200 volt, 50 Hz, 3 phase A.C. supply. Calculate line current, phase current, phase voltage, total power absorbed and power factor of the combination. Also draw complete vector diagram.
- 3) Find current through impedance  $3 + j5$  using superposition theorem in the following circuit :



4. Attempt any four.

16

- a) Calculate frequency, RMS value, average value and amplitude of the waveform.





## MARKS

- b) A series circuit consisting of  $R = 100\Omega$  and  $C = 200\ \mu\text{F}$  connected across 200 volt 50 Hz supply calculate  $V_R$ ,  $V_C$ ,  $I$  and power absorbed by the circuit.
- c) Calculate currents  $I_1$ ,  $I_2$  and total current  $I$ ; in the circuit shown in Fig. [B]

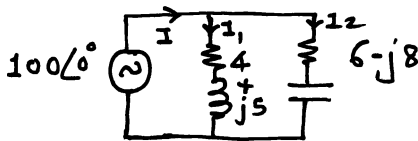


Fig. B

- d) Explain how three phase emf can be generated ? Write down three phase voltage equations and the meaning of phase sequence.
- e) A star connected balanced load consumes 1500 w power when connected to 3 phase 400 volt 50 Hz supply. If the power factor is  $\frac{1}{\sqrt{2}}$  lagging, calculate the value of resistance and inductance of each phase.
- f) Derive the formulae for star to delta transformation.

## 5. Attempt any four.

16

- a) A series RLC circuit consists of  $R = 10\Omega$ ,  $L = 0.2\text{ H}$  and  $C = 50\ \mu\text{F}$  supplied with 200 V variable frequency supply. Find.
- 1) Frequency at which the circuits behaves as purely resistive circuit and
  - 2) Quality factor.
- b) How voltage source can be converted in to equivalent current source ? Where it is used ? Draw neat diagrams of both the sources.



c) Find line and phase current through each line of the combination show in Fig. C.

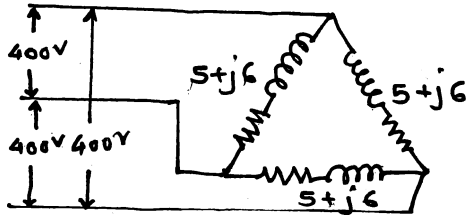


Fig. C

d) Explain Q factor for parallel RL-C circuit.

e) Using Norton's theorem find current through  $R_L$  in Fig. D.

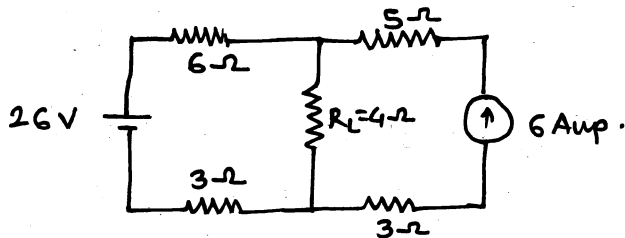


Fig. D

f) Using superposition theorem find current through  $R_L$  in Fig. E.

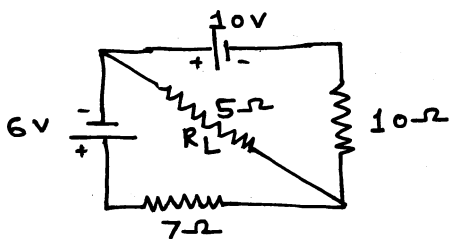


Fig. E

6. Attempt any four.

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a) Using mesh analysis for Fig. F. find the values of  $R_1$  and  $R_2$ .

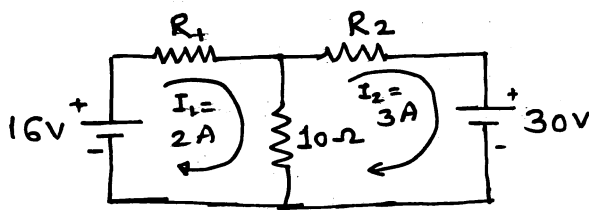


Fig. F



- b) Find current through  $8\Omega$  resistance using nodal analysis in Fig. G

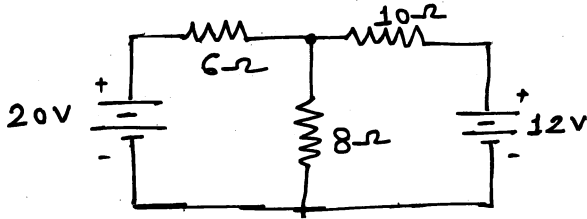


Fig. G

- c) Develop Thevenin's equivalent circuit across A and B in the network shown in Fig. H.

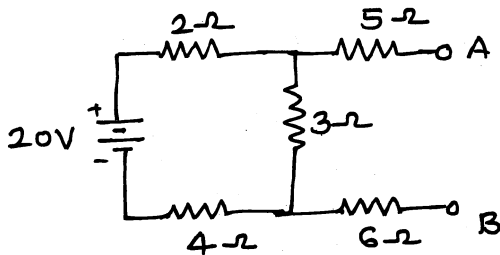


Fig. H

- d) Find the value of  $R_L$  to transfer maximum power in the network shown in Fig. I

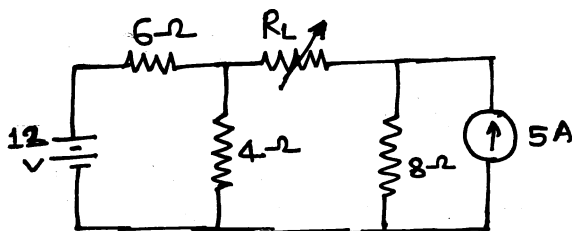


Fig. I



e) Find the voltages at nodes A and B in the network shown in Fig. J

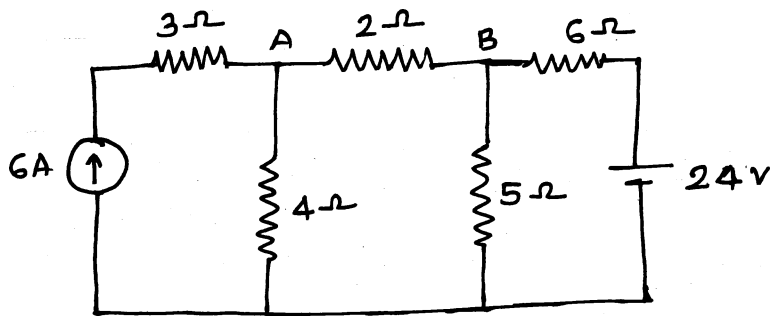


Fig. J

f) Explain the concept of initial and final conditions in switching circuits for the elements R, L and C.

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